

Search Plan and Results

Question

[What is the effect of a reduced sodium intake on blood pressure in children from birth to age 18 years? \(DGAC 2010\)](#)

Date Searched

Feb. 24, 2009, May 26, 2009

Inclusion Criteria

Subjects/Population

- *Age:* Birth to 18 years
- *Setting:* US and International
- *Health Status:* Healthy.

Search Criteria

- *Study design preferences:* Randomized controlled trials (RCT) or clinical controlled studies, large prospective cohort studies, meta-analyses, systematic reviews
- *Study dropout rate:* Less than 20%; preference for smaller dropout rates
- *Year range:* 1970 to present (May 2009)
- *Languages:* Limited to articles in English
- *Other:* Article must be published in peer-reviewed journal.

Exclusion Criteria

Subjects/Population

- *Age:* Adult
- *Setting:* Inpatients
- *Health status:* Diagnosed with disease or medical condition.

Search Criteria

- *Study design:* Cross-sectional, pre- and post-intervention
- *Size of study groups:* Sample sizes less than 10
- *Study dropout rate:* 20% or greater
- *Year range:* Prior to 1970
- *Authorship:* Studies by same author similar in content
- *Languages:* Articles not in English
- *Other:* Animal or in vitro studies; abstracts or presentations.

Search Terms: Search Vocabulary

("Hypertension"[mesh] OR "blood pressure"[MeSH Terms]) AND ("Sodium, Dietary"[Mesh] OR "sodium"[MeSH Terms] OR "sodium chloride"[mesh]) Limits: All Child: 0-18 years, Publication Date from 1970 to 2009/03 AND "english and humans"[Filter]

Electronic Databases

PubMed.

Total hits from all electronic database searches: 990

Total articles identified to review from electronic databases: 126

Articles Identified Via Handsearch or Other Means

Hand search: One study

Pomeranz A, Dolfin T, Korzets Z, Eliakim A, Wolach B. [Increased sodium concentrations in drinking water increase blood pressure in neonates](#). *J Hypertens*. 2002; 20: 203–207. PMID: 11821704.

Summary of Articles Identified to Review

Number of Primary Articles Identified: 19

Number of Review Articles Identified: 0

Total Number of Articles Identified: 19

Number of Articles Reviewed but Excluded: 108

List of Articles Included for Evidence Analysis

Brion MJ, Ness AR, Davey Smith G, Emmett P, Rogers I, Whincup P, Lawlor DA. et al. [Sodium intake in infancy and blood pressure at 7 years: Findings from the Avon Longitudinal Study of Parents and Children](#). *Eur J Clin Nutr*. 2008.

Calabrese EJ, Tuthill RW. [The Massachusetts Blood Pressure Study, Part 3. Experimental](#)

[reduction of sodium in drinking water: Effects on blood pressure.](#) *Toxicol Ind Health.* 1985; 1: 19-34. PMID: 3842544.

Cooper R, Van Horn L, Liu K, Trevisan M, Nanas S, Ueshima H, Larbi E, Yu C-S, Sempos C, LeGrady D, Stamler J. [A randomized trial on the effect of decreased dietary sodium intake on blood pressure in adolescents.](#) *J Hypertens.* 1984; 2: 361-366. PMID: 6530546.

Geleijnse JM, Hofman A, Witteman JC, Hazebroek AA, Valkenburg HA, Grobbee DE. [Long-term effects of neonatal sodium restriction on blood pressure.](#) *Hypertension.* 1997; 29: 913-917. PMID: 9095076.

Geleijnse JM, Grobbee DE, Hofman A. [Sodium and potassium intake and blood pressure change in childhood.](#) *BMJ.* 1990; 300: 899-902.

Gillum RF, Elmer PJ, Prineas RJ. [Changing sodium intake in children. The Minneapolis Children's Blood Pressure Study.](#) *Hypertension.* 1981; 3: 698-703. PMID: 7298122.

Hofman A, Hazebroek A, Valkenburg HA. [A randomized trial of sodium intake and blood pressure in newborn infants.](#) *JAMA.* 1983; 250: 370-373. PMID: 6343656.

Howe PRC, Cobiac L, Smith RM. [Lack of effect of short-term changes in sodium intake on blood pressure in adolescent schoolchildren.](#) *J Hypertens.* 1991; 9: 191-186.

Howe PRC, Jureidini KF, Smith RM. Sodium and blood pressure in children – a short-term dietary intervention study. *Proc Nutr Soc Aust.* 1985; 10: 121-124.

Lucas A, Morley R, Hudson GJ, Bamford MF, Boon A, Crowle P, Dossetor JF, Pearse R. [Early sodium intake and later blood pressure in preterm infants.](#) *Arch Dis Child.* 1988 Jun; 63(6): 656-657. PMID: 3389898; PMCID: PMC1778882.

Myers JB. [Reduced sodium chloride intake normalises blood pressure distribution.](#) *J Hum Hypertens.* 1989; 3: 97-104. PMID: 2760911.

Palacios C, Wigertz K, Martin BR, Jackman L, Pratt JH, Peacock M, McCabe G, Weaver CM. [Sodium retention in black and white female adolescents in response to salt intake.](#) *J Clin Endocrinol Metab.* 2004; 89: 1, 858-1, 863.

Pomeranz A, Dolfin T, Korzets Z, Eliakim A, Wolach B. [Increased sodium concentrations in drinking water increase blood pressure in neonates.](#) *J Hypertens.* 2002; 20: 203-207. PMID: 11821704. Infants (Hand Search 04/07/09)

Sinaiko AR, Gomez-Marin O, Prineas RJ. [Effect of low sodium diet or potassium supplementation on adolescent blood pressure.](#) *Hypertension.* 1993; 21: 989-994.

Smith RE, Kok A, Rothberg AD, Groeneveld HT. [Determinants of blood pressure in Sowetan infants.](#) *S Afr Med J.* 1995 Dec; 85(12 Pt 2): 1, 339-1, 342. PMID: 8600606.

Trevisan M, Cooper R, Ostrow D, Miller W, Sparks S, Leonas Y, Allen A, Steinhauer M, Stamler J. [Dietary sodium, erythrocyte sodium concentration, sodium-stimulated lithium efflux and blood pressure.](#) *Clin Sci (Colch).* 1981; 61: 29S-32S. PMID: 7318331.

Tuthill RW, Calabrese EJ. [The Massachusetts Blood Pressure Study, Part 2. Modestly elevated levels of sodium in drinking water and blood pressure levels in high school students.](#) *Toxicol Ind Health.* 1985 Sep; 1(1): 11-17. PMID: 3842543.

Whitten CF, Stewart RA [The effect of dietary sodium in infancy on blood pressure and related factors. Studies of infants fed salted and unsalted diets for five months at eight months and eight years of age](#). *Acta Paediatr Scand.* 1980; 279 (suppl): 1-17. PMID: 7001854.

List of Excluded Articles with Reason

Article (A-K)	Reason for Exclusion
<p>Adamopoulos PN, Chaniotis F, Kodoyianis S, Boutsicakis J, Madalos P, Kassos D, Gatos A, Moulopoulos S. Table salt and blood pressure in Greek children. <i>J Hum Hypertens.</i> 1987; 1(3): 209-213.</p>	Cross-sectional study design.
<p>Antonios TF. Salt intake in early life and cardiovascular risk. <i>Acta Paediatr.</i> 2000 Apr; 89(4): 397-398. No abstract available. PMID: 10830448.</p>	Editorial publication.
<p>Arguelles J, Diaz JJ, Malaga I, Perillan C, Costales M, Vijande M. Sodium taste threshold in children and its relationship to blood pressure. <i>Braz J Med Biol Res.</i> 2007 May; 40(5): 721-726.</p>	Does not address question. Supports what is known already.
<p>Armstrong BK, Margetts BM, Binns CW, Campbell NA, Masarei JR, McCall MG. Water sodium and blood pressure in rural school children. <i>Arch Environ Health.</i> 1982 Jul-Aug; 37(4): 236-245. PMID: 7114905.</p>	Cross-sectional study design.
<p>Basile JN., Ralph H. Johnson. Salt sensitivity predicts mortality independently of elevated blood pressure: a 27-year follow-up study. <i>J Clin Hypertens (Greenwich).</i> 2001 Jul-Aug; 3(4): 258-259. VA Medical Center and the Medical College of South Carolina, Charleston, 29403, USA. PMID: 11505946.</p>	Editorial publication.
<p>Beretta-Piccoli C, Weidmann P, Brown JJ, Davies DL, Lever AF, Robertson JI. Body sodium blood volume state in essential hypertension: Abnormal relation of exchangeable sodium to age and blood pressure in male patients. <i>J Cardiovasc Pharmacol.</i> 1984; 6 Suppl 1: S134-S142. PMID: 6204132.</p>	Adult study population.
<p>Calabrese EJ, Tuthill RW. The Massachusetts Blood Pressure Study, Part 1. The Massachusetts Blood Pressure Study, Part 1. Elevated levels of sodium in drinking water and blood pressure levels in children. <i>Toxicol Ind Health.</i> 1985 Sep; 1(1): 1-10. PMID: 3842542.</p>	Does not address question. Focus was sodium in drinking water.
<p>Chen J, Gu D, Jaquish CE, Chen CS, Rao DC, Liu D, Hixson JE, Hamm LL, Gu CC, Whelton PK, He J; GenSalt Collaborative Research Group. Association between blood pressure responses to the cold pressor test and dietary sodium intervention in a Chinese population. <i>Arch Intern Med.</i> 2008 Sep 8; 168(16): 1, 740-1, 746. PMID: 18779460.</p>	Adult study population.
<p>Cheung BM, Ho SP, Cheung AH, Lau CP. Diastolic blood pressure is related to urinary sodium excretion in hypertensive Chinese patients. <i>QJM.</i> 2000 Mar; 93(3): 163-168. PMID: 10751235.</p>	Adult study population.

<p>Connor SL, Connor WE, Henry H, Sexton G, Keenan EJ. The effects of familial relationships, age, body weight, and diet on blood pressure and the 24 hour urinary excretion of sodium, potassium, and creatinine in men, women, and children of randomly selected families. <i>Circulation</i>. 1984 Jul; 70(1): 76-85. PMID: 6723013.</p>	<p>Does not answer question. Focus was familial influence on outcomes.</p>
<p>Cooper R, Liu K, Trevisan M, Miller W, Stamler J. Urinary sodium excretion and blood pressure in children: absence of a reproducible association. <i>Hypertension</i>. 1983 Jan-Feb; 5(1): 135-139. PMID: 6848460.</p>	<p>Cross-sectional study design.</p>
<p>Cooper R, Soltero I, Liu K, Berkson D, Levinson S, Stamler J. The association between urinary sodium excretion and blood pressure in children. <i>Circulation</i>. 1980 Jul; 62(1): 97-104. PMID: 7379290.</p>	<p>Cross-sectional study design.</p>
<p>Couch SC, Daniels SR. Diet and blood pressure in children. <i>Curr Opin Pediatr</i>. 2005; (5): 642-647. PMID: 16160541.</p>	<p>Narrative review.</p>
<p>Daniels SR, Loggie JM, Khouri P, Kimball TR. Left ventricular geometry and severe left ventricular hypertrophy in children and adolescents with essential hypertension. <i>Circulation</i>. 1998; 97: 1, 907-1, 911. PMID: 9609083.</p>	<p>Outcome was left ventricular geometry and hypertrophy.</p>
<p>DeSanto NG, Trevisan M, Capasso G, Giordano DR, Latte M, Krogh V. Blood pressure and hypertension in childhood: Epidemiology, diagnosis, and treatment. <i>Kidney Int Suppl</i>. 1988 Sep; 25: S115-S118. PMID: 3054226.</p>	<p>Does not address question. Focus was blood pressure diagnosis and treatment.</p>
<p>Du Cailar G, Mimran A, Fesler P, Ribstein J, Blacher J, Safar ME. Dietary sodium and pulse pressure in normotensive and essential hypertensive subjects. <i>J Hypertens</i>. 2004; 22: 697-703.</p>	<p>Does not answer question. <u>Adult</u> study population.</p>
<p>Du Cailar G, Ribstein J, Daures JP, Mimran A. Sodium and left ventricular mass in untreated hypertensive and normotensive subjects. <i>Am J Physiol</i>. 1992 Jul; 263(1 Pt 2): H177-H181. PMID: 1636756.</p>	<p>Does not answer question. Focus was left ventricular mass.</p>
<p>du Cailar G, Ribstein J, Grolleau R, Mimran A. Influence of sodium intake on left ventricular structure in untreated essential hypertensives. <i>J Hypertens Suppl</i>. 1989 Dec; 7(6): S258-S259. PMID: 2534413.</p>	<p>Does not answer question. Focus was left ventricular structure.</p>
<p>Du Cailar G, Ribstein J, Mimran A. Dietary sodium and target organ damage in essential hypertension. <i>Am J Hypertens</i>. 2002 Mar; 15(3): 222-229. PMID: 11939611.</p>	<p>Cross-sectional study design.</p>
<p>Elghozi JL, Dagher G, Garay RP, Vasmant D, Girard F, Meyer P. A case of juvenile essential hypertension: Implications of erythrocyte net Na+, K+ flux measurement. <i>Biomedicine</i>. 1981 Mar; 35(1): 4-6. PMID: 7236847.</p>	<p>Does not answer the question. Focused on RBC electrolyte changes.</p>
<p>Elliott P. Sodium and blood pressure: a review of the evidence from controlled trials of sodium reduction and epidemiological studies. <i>Klin Wochenschr</i>. 1991; 69 Suppl. 25: 3-10. PMID: 1921248.</p>	<p>Narrative review.</p>
<p>Ellison RC, Sosenko JM, Harper GP, Gibbons L, Pratter FE, Miettinen OS. Obesity, sodium intake, and blood pressure in adolescents. <i>Hypertension</i>. 1980 Jul-Aug; 2(4 Pt 2): 78-82.</p>	<p>Cross-sectional study design.</p>
<p>Falkner B, Michel S. Blood pressure response to sodium in children and adolescents. <i>Am J Clin Nutr</i>. 1997; 65(2 Suppl): 618S-621S. PMID: 9022557.</p>	<p>Narrative review.</p>
<p>Falkner B, Sherif K, Michel S, Kushner H. Dietary nutrients and blood pressure in urban minority adolescents at risk for hypertension. <i>Arch Pediatr Adolesc Med</i>. 2000 Sep; 154(9): 918-922.</p>	<p>Cross-sectional study design.</p>

Forte JG, Miguel JM, Miguel MJ, de Pádua F, Rose G. Salt and blood pressure: A community trial. <i>J Hum Hypertens</i> . 1989 Jun; 3(3): 179-184. PMID: 2671369.	Adult study population.
Frost CD, Law MR, Wald NJ. By how much does dietary salt reduction lower blood pressure? II--Analysis of observational data within populations. <i>BMJ</i> . 1991 Apr 6; 302(6, 780): 815-818. PMID: 2025704.	Narrative review.
Geleijnse JM, Grobbee DE. High salt intake early in life: does it increase the risk of hypertension? <i>J Hypertens</i> . 2002 Nov; 20(11): 2, 121-2, 124. Review. No abstract available. PMID: 12409942.	Editorial publication.
GenSalt Collaborative Research Group. GenSalt: rationale, design, methods and baseline characteristics of study participants . <i>J Hum Hypertens</i> . 2007 Aug; 21(8): 639-646. Epub 2007 PMID: 17443206.	Does not answer question. Paper describes study design and methodology.
Gómez-Marín O, Prineas RJ, Sinaiko AR. The Sodium-Potassium Blood Pressure Trial in Children. Design, recruitment, and randomization: The children and adolescent blood pressure program. <i>Control Clin Trials</i> . 1991 Jun; 12(3): 408-23. PMID: 1651211.	Does not address the question. Paper describes study design and recruitment.
Grobbee DE, Hofman A. Does sodium restriction lower blood pressure? <i>Br Med J (Clin Res Ed)</i> . 1986 Jul 5; 293(6, 538): 27-29. PMID: 3089393; PMCID: PMC1340776.	Adult study population.
Gudmundsson O, Cederblad A, Wikstrand J, Berglund G. Sodium elimination rate and blood pressure during normal and high salt intake in subjects with and without familial predisposition to hypertension . <i>Acta Med Scand</i> . 1984; 216(4): 345-352. PubMed PMID: 6516904.	Adult study population.
Hallenbeck WH, Brenniman GR, Anderson RJ. High sodium in drinking water and its effect on blood pressure . <i>Am J Epidemiol</i> . 1981 Dec; 114(6): 817-26. PMID: 7315830.	Cross-sectional study design.
Harshfield GA, Pulliam DA, Alpert BS, Stapleton FB, Willey ES, Somes GW . Ambulatory blood pressure patterns in children and adolescents: influence of renin-sodium profiles. <i>Pediatrics</i> 1991 Jan; 87(1): 94-100.	Cross-sectional study design.
He, Feng J.; MacGregor, Graham A. Importance of salt in determining blood pressure in children: Meta-analysis of controlled trials . <i>Hypertension</i> . 2006; 48(5): 861-869. PMID: 17000923.	Meta-analysis. DGAC reviewed the primary studies that were examined in this paper.
He FJ, Marrero NM, MacGregor GA.* Salt intake is related to soft drink consumption in children and adolescents: a link to obesity? <i>Hypertension</i> . 2008 Mar; 51(3): 629-634. PMID: 18287345.	Cross-sectional study design.
Hill RM, Gambhir KK, Archer JA, Curry CL. Blood pressure and urinary sodium in black American adolescents . <i>J Natl Med Assoc</i> . 1984 Jun; 76(6): 579-585. PMID: 6748101; PMCID: PMC2561707.	Cross-sectional study design.
Hoffman CJ. Does the sodium level in drinking water affect blood pressure levels? <i>J Am Diet Assoc</i> . 1988 Nov; 88(11): 1, 432-1, 435. PMID: 3183265.	Does not address question. Focus was drinking water.
Hofman A, Valkenburg HA, Vaandrager GJ. Increased blood pressure in schoolchildren related to high sodium levels in drinking water . <i>J Epidemiol Community Health</i> . 1980 Sep; 34(3): 179-181. PMID: 7441137; PMCID: PMC1052072.	Retrospective cross-sectional.

Holden RA, Ostfeld AM, Freeman DH Jr, Hellenbrand KG, D'Atri DA. Dietary salt intake and blood pressure . <i>JAMA</i> . 1983 Jul 15; 250(3): 365-369. PMID: 6854900.	Adult study population.
Hooper L, Bartlett C, Davey Smith G, Ebrahim S. Systematic review of long term effects of advice to reduce dietary salt in adults . <i>BMJ</i> . 2002 Sep 21; 325(7, 365): 628. Review. PMID: 12242173; PMCID: PMC126303.	Adult study population.
Howe PR, Rogers PF, Smith RM, Jureidini KF. Effects of short-term modification of dietary sodium intake on plasma catecholamines and blood pressure in prehypertensive children . <i>Clin Exp Pharmacol Physiol</i> . 1986 Apr; 13(4): 305-309. PMID: 3731534.	Same study as Howe et al, 1985, which is already included.
Ingelfinger JR. Sodium and blood pressure in infancy . <i>JAMA</i> . 1983 Jul 15; 250(3): 389-390. PMID: 6854907.	Editorial publication.
Jenner DA, English DR, Vandongen R, Beilin LJ, Armstrong BK, Miller MR, Dunbar D. Diet and blood pressure in 9-year-old Australian children . <i>Am J Clin Nutr</i> . 1988 Jun; 47(6): 1, 052-1, 059.	Cross-sectional study design.
Jones MR, Sealey JE, Laragh JH. Effects of angiotensin receptor blockers on ambulatory plasma Renin activity in healthy, normal subjects during unrestricted sodium intake. <i>Am J Hypertens</i> . 2007 Aug; 20(8): 907-16. PMID: 17679042.	Study population had cystic fibrosis.
Joshi S, Gupta S, Tank S, Malik S, Salgaonkar DS. Essential hypertension: Antecedents in children. <i>Indian Pediatr</i> . 2003 Jan; 40(1): 24-29.	Adult study population.
Karp RJ, Williams C, Grant JO. Increased utilization of salty food with age among preteenage black girls . <i>J Natl Med Assoc</i> . 1980 Mar; 72(3): 197-200. PMID: 7392064; PMCID: PMC2552550.	Cross-sectional study design.
Key J, Bondie D, Chico R, Moorehead C, Katch V, Martin M. The effect of weight loss on the sensitivity of blood pressure to sodium in obese adolescents . <i>N Engl J Med</i> . 1989 Aug 31; 321(9): 580-585. PMID: 2668763.	Does not answer question. Study examined weight loss and blood pressure (BP).
Knuiman JT, Hautvast JG, Zwiauer KF, Widhalm K, Desmet M, De Backer G, Rahneva RR, Petrova VS, Dahl M, Viikari J, et al. Blood pressure and excretion of sodium, potassium, calcium and magnesium in 8- and 9-year old boys from 19 European centres . <i>Eur J Clin Nutr</i> . 1988 Oct; 42(10): 847-855. PMID: 3234325.	Cross-sectional study design.

Article (L-R)	Reason for Exclusion
Law MR, Frost CD, Wald NJ. Dietary salt and blood pressure . <i>J Hypertens Suppl</i> . 1991 Dec; 9(6): S37-S41; discussion S47-S49.	Narrative review.
Lawlor DA, Smith GD. Early life determinants of adult blood pressure . <i>Curr Opin Nephrol Hypertens</i> . 2005; 14(3): 259-264. PMID: 15821420.	Narrative review.

Legris GJ, Dearborn D, Stern RC, Geiss CL, Hopfer U, Douglas JG, Doershuk CF. Sodium space and intravascular volume: dietary sodium effects in cystic fibrosis and healthy adolescent subjects. <i>Pediatrics</i> . 1998 Jan; 101(1 Pt 1): 48-56. PMID: 9417150.	Study population had cystic fibrosis.
Leong GM, Kainer G. Diet, salt, anthropological and hereditary factors in hypertension. <i>Child Nephrol Urol</i> . 1992; 12(2-3): 96-105. Review. PMID: 1628278.	Does not address question. Focus was genetics.
Lieberman E. Blood pressure and primary hypertension in childhood and adolescence. <i>Curr Probl Pediatr</i> . 1980 Feb; 10(4): 1-35. PMID: 6989558.	Study reports BP in adulthood.
Liebman M, Chopin LF, Carter E, Clark AJ, Disney GW, Hegsted M, Kenney MA, et al. Factors related to blood pressure in a biracial adolescent female population. <i>Hypertension</i> . 1986; 8: 843-850.	Cross-sectional study design.
Liu ZQ, Yang DY, Xu XL, Yang J. <u>Sodium and potassium levels in hypertensive children</u> . <i>Chin Med J (Engl)</i> . 1989 Oct; 102(10): 759-764. PMID: 2517056.	Does not address question. Study was a saline load test; short intervention (three days).
Luque Otero M, Sa?chez RG, Martell Claros N, Fernández Pinilla C, Martínez Zamora M, Sacristán Sevilla A, Fernández Cruz A. <u>Relationship of blood pressure levels to height, weight and sodium and potassium excretion in Spanish children</u> . <i>J Hypertens Suppl</i> . 1985 Dec; 3(3): S391-S393. PMID: 2856748.	Cross-sectional study design. Focus was distribution of BP by age in Spanish children.
Málaga S, Díaz JJ, Arguelles J, Perillán C, Málaga I, Vijande M. Blood pressure relates to sodium taste sensitivity and discrimination in adolescents. <i>Pediatr Nephrol</i> . 2003 May; 18(5): 431-434. Epub 2003 Apr 5.	Study examined sodium taste sensitivity and BP in adolescents, not sodium intake.
Maseko MJ, Majane HO, Milne J, Norton GR, Woodiwiss AJ. Salt intake in an urban, developing South African community. <i>Cardiovasc JS Afr</i> . 2006 Jul-Aug; 17(4): 186-191. PMID: 17001421.	Does not address question. Adult offspring study population.
Mikkila V, Rasaen L, Raitakari OT, Pietinen P, Viikari J. Longitudinal changes in diet from childhood into adulthood with respect to risk of cardiovascular diseases: The Cardiovascular Risk in Young Finns Study. <i>European Journal of Clinical Nutrition</i> . 2004; 58, 1, 038-1, 045.	Study analyses did not include BP change in relation to changes in sodium intake.
Miller JZ, Weinberger MH, Daugherty SA, Fineberg NS, Christian JC, Grim CE. <u>Blood pressure response to dietary sodium restriction in healthy normotensive children</u> . <i>Am J Clin Nutr</i> . 1988 Jan; 47(1): 113-119. PMID: 3337029.	Study design was an uncontrolled pre-and post-study.
Miller JZ, Weinberger MH. <u>Blood pressure response to sodium restriction and potassium supplementation in healthy normotensive children</u> . <i>Clin Exp Hypertens A</i> . 1986; 8(4-5): 823-827. PMID: 3530556.	Study design was an uncontrolled pre-and post-study. Almost same data as Miller JZ et al, 1988 above.
Mo R, Omvik P, Lund-Johansen P, Myking OL. The Bergen blood pressure study: Sodium intake and ambulatory blood pressure in offspring of hypertensive and normotensive families. <i>Blood Press</i> . 1993 Dec; 2(4): 278-283. PMID: 8173696.	The publication was a letter.

<p>Mu JJ, Liu ZQ, Liu WM, Liang YM, Yang DY, Zhu DJ, Wang ZX. <u>Reduction of blood pressure with calcium and potassium supplementation in children with salt sensitivity: a 2-year double-blinded placebo-controlled trial.</u> <i>J Hum Hypertens.</i> 2005; 19(6): 479-483.</p>	<p>Did not answer question. Sodium intake was not included in analyses.</p>
<p>Mülhauser I, Prange K, Sawicki PT, Bender R, Dworschak A, Schaden W, Berger M. <u>Effects of dietary sodium on blood pressure in IDDM patients with nephropathy.</u> <i>Diabetologia.</i> 1996 Feb; 39(2): 212-219. PMID: 8635674.</p>	<p>Study population had diabetes and neuropathy.</p>
<p>Myers J, Morgan T. <u>The effect of sodium intake on the blood pressure related to age and sex.</u> <i>Clin Exp Hypertens A.</i> 1983; 5(1): 99-118. PMID: 6831741.</p>	<p>Adult study population.</p>
<p>Nader PR, Stone EJ, Lytle LA, Perry CL, Osganian SK, Kelder S, Webber LS, et al. Three-Year Maintenance of Improved Diet and Physical Activity. The CATCH Cohort. <i>Arch Pediatr Adolesc Med.</i> 1999; 153: 695-704.</p>	<p>Does not answer question. No contrast in sodium intake between treatment groups after intervention.</p>
<p>Neyses L, Dorst K, Michaelis J, Berres M, Philipp T, Distler A, Losse H, Vetter H, Epstein FH, Vetter W. <u>Compliance with salt restriction as a limiting factor in the primary prevention of hypertension.</u> <i>J Hypertens Suppl.</i> 1985 Apr; 3(1): S87-S90. PMID: 3916444.</p>	<p>Adult and adolescent study population.</p>
<p>Okoro EO, Uroghide GE, Jolayemi ET. Salt taste sensitivity and blood pressure in adolescent school children in southern Nigeria. <i>East Afr Med J.</i> 1998 Apr; 75(4): 199-203.</p>	<p>Does not answer question. Study examined sodium taste sensitivity and BP in adolescents, not sodium intake.</p>
<p>Pazarloglou M, Spaia S, Pagkalos E, Ioannidis H, Askepidis N, Varyemezis V. Evaluation of insulin resistance and sodium sensitivity in normotensive offspring of hypertensive individuals. <i>Am J Kidney Dis.</i> 2007 Apr; 49(4): 540-546. PMID: 17386322.</p>	<p>Does not answer question. Study examined insulin and sodium sensitivity, not sodium intake.</p>
<p>Pearce MS, Relton CL, Unwin NC, Adamson AJ, Smith GD. The relation between diarrhoeal episodes in infancy and both blood pressure and sodium intake in later life: The Newcastle Thousand Families Study. <i>J Hum Hypertens.</i> 2008 Aug ;22(8): 582-584. Epub 2008 May 22. PMID: 18496557.</p>	<p>Does not address the question for children.</p>
<p>Pomerantz A, Korzets Z, Vanunu D, Krystal H, Wolach. Elevated salt and nitrate levels in drinking water cause an increase of blood pressure in schoolchildren. <i>Kidney Blood Pressure Res.</i> 2000; 23: 400-403.</p>	<p>Cross-sectional study design.</p>
<p>Porter LE, Hollenberg NK. Obesity, salt intake, and renal perfusion in healthy humans. <i>Hypertension.</i> 1998 Jul; 32(1): 144-148. PMID: 9674651.</p>	<p>Does not clearly address the question for children; 18-year-old adolescents grouped with adults.</p>
<p>Poulter N, Khaw KT, Hopwood BE, Mugambi M, Peart WS, Sever PS. <u>Salt and blood pressure in various populations.</u> <i>J Cardiovasc Pharmacol.</i> 1984; 6 Suppl 1: S197-S203. PMID: 6204141.</p>	<p>Cross-sectional study design.</p>
<p>Robertson JS. <u>Water sodium, urinary electrolytes, and blood pressure of adolescents.</u> <i>J Epidemiol Community Health.</i> 1984 Sep; 38(3): 186-194. PMID: 6540793; PMCID: PMC1052350.</p>	<p>Cross-sectional study design.</p>

Robertson JI. Long-term effects of neonatal sodium restriction on blood pressure . <i>Am J Hypertens.</i> 1997 Dec; 10(12 Pt 1): 1, 425. PMID: 9443781.	Commentary publication.
Rocchini AP, Key J, Bondie D, Chico R, Moorehead C, Katch V, Martin M. The effect of weight loss on the sensitivity of blood pressure to sodium in obese adolescents . <i>N Engl J Med.</i> 1989 Aug 31; 321(9): 580-585. PMID: 2668763.	Design was an uncontrolled pre- and post- study.

Article (S-Z)	Reason for Exclusion
Savoca MR, Domel Baxter S, Ludwig DA, Evans CD, Mackey ML, Wilson ME, Hanevold C, Harshfield GA. A 4-day sodium-controlled diet reduces variability of overnight sodium excretion in free-living normotensive adolescents . <i>J Am Diet Assoc.</i> 2007 Mar; 107(3): 490-494. PMID: 17324668.	Does not answer question. Short-term intervention examined sodium excretion.
Schiffl H, Küchle C, Lang S. Dietary salt, intracellular ion homeostasis and hypertension secondary to early-stage kidney disease . <i>Miner Electrolyte Metab.</i> 1996; 22(1-3): 178-181. PMID: 8676814.	Study population had renal HTN.
Sempos C, Cooper R, Trevisan M, Ostrow D, Stamler J. Family history of hypertension and rates of sodium transport: absence of an association in population-based studies . <i>Clin Exp Hypertens A.</i> 1984; 6(7): 1, 379-1, 393. PMID: 6331918.	Cross-sectional study design.
Simon JA, Obarzanek E, Daniels SR, Frederick MM. Dietary cation intake and blood pressure in black girls and white girls . <i>Am J Epidemiol.</i> 1994 Jan 15; 139(2): 130-140.	Cross-sectional study design analysis within a prospective cohort study.
Simonetti GD, Raio L, Surbek D, Nelle M, Frey FJ, Mohaupt MG. Salt sensitivity of children with low birth weight . <i>Hypertension.</i> 2008 Oct; 52(4): 625-630. Epub 2008 Aug 11.	Does not answer question. Study examined glomerular filtration rate and salt sensitivity in low-birth weight children.
Sorof JM, Forman A, Cole N, Jemerin JM, Morris RC. Potassium intake and cardiovascular reactivity in children with risk factors for essential hypertension. <i>J Pediatr.</i> 1997 Jul; 131(1 Pt 1): 87-94. PMID: 9255197.	Does not clearly address the question for children. 18-year-old adolescents grouped with adults.
Staessen JA, Lijnen P, Thijs L, Fagard R. (1997) Salt and blood pressure in community-based intervention trials . <i>Am J Clin Nutr.</i> 1997 Feb; 65(2 Suppl): 661S-670S. PMID: 9022562.	Narrative review.
Tekol Y. Irreversible and reversible components in the genesis of hypertension by sodium chloride (salt). <i>Med Hypotheses.</i> 2008; 70(2): 255-259. Epub 2007 Aug 6. PMID: 17689201.	Paper presented hypotheses.
Tian HG, Guo ZY, Hu G, Yu SJ, Sun W, Pietinen P, Nissinen A. Changes in sodium intake and blood pressure in a community-based intervention project in China . <i>J Hum Hypertens.</i> 1995 Dec; 9(12): 959-968. PMID: 8746640.	Cross-sectional study design.

Tochikubo O, Sasaki O, Umemura S, Kaneko Y. Management of hypertension in high school students by using new salt titrator tape . <i>Hypertension</i> . 1986 Dec; 8(12): 1, 164-1, 171. PMID: 3793198.	Study was an uncontrolled pre- and post-study.
Trevisan M, Borillo J. Na-Li countertransport and blood pressure in childhood. <i>Child Nephrol Urol</i> . 1992; 12(2-3): 85-89. Review. No abstract available. PMID: 1628276.	Does not address question. Study examined sodium-lithium transport mechanism.
Trevisan M, Cooper R, Stamler R, Gosch F, Allen A, Liu K, Ostrow D, Stamler J. Dietary salt and blood pressure . <i>Prev Med</i> . 1983 Jan; 12(1): 133-137. PMID: 6844292.	Narrative review.
Tucker DT, Smothers M, Lewis C, Feldman H. Effects of decreased dietary salt intake on blood pressure in preschool children. <i>J Nat Med Assoc</i> . 1989; 81: 299-302.	Cross-sectional study design.
Tuthill RW, Calabrese EJ. Age as a function in the development of sodium-related hypertension . <i>Environ Health Perspect</i> . 1979 Apr; 29: 35-43. PMID: 510240; PMCID: PMC1637368.	Does not address question directly. Study examined BP changes with age.
Tuthill RW, Calabrese EJ. Drinking water sodium and blood pressure in children: A second look . <i>Am J Public Health</i> . 1981 Jul; 71(7): 722-729. PMID: 7246839; PMCID: PMC1619774.	Cross-sectional study design. DGAC reviewed most recent paper (1985) by these authors on this study population.
Tuthill RW, Sonich C, Okun A, Greathouse D. The influence of naturally and artificially elevated levels of sodium in drinking water on blood pressure in school children . <i>J Environ Pathol Toxicol</i> . 1980 Sep; 4(2-3): 173-181. PMID: 7462899.	Cross-sectional study design. DGAC reviewed most recent paper (1985) by these authors on this study population.
Tzemos N, Lim PO, Wong S, Struthers AD, MacDonald TM. Adverse cardiovascular effects of acute salt loading in young normotensive individuals. <i>Hypertension</i> . 2008; 51: 1, 525-1, 530.	Study population appears to be adults, including university students. Specific age of subjects not reported.
Uchiyama M, Daman Willems CE, Shah V, Dillon MJ. Sodium transport in erythrocytes: Differences between normal children and children with primary and secondary hypertension . <i>Clin Exp Hypertens A</i> . 1986; 8(4-5): 669-671. PMID: 2428549.	Does not answer question. Study examined sodium transport in a hypertensive pediatric population.
Uchiyama M, Otsuka T, Shibusawa Y, Sakai K. Urinary sodium and potassium excretion in normotensive children in northern Japan . <i>J Chronic Dis</i> . 1984; 37(12): 956-958. PMID: 6526931.	Publication was a letter.
Ukoh VA, Ukoh GC, Okosun RE, Azubike E. Salt intake in first degree relatives of hypertensive and normotensive Nigerians. <i>East African Med J</i> . 2004; 81: 524-528.	Cross-sectional study design. Adult and adolescent study population (15 to 25 years of age).
Walker AR, Walker BF, Daya L, Ncongwane J. Blood pressures of South African Black adolescents aged 16 to 17 years. <i>Trans R Soc Trop Med Hyg</i> . 1980; 74(5): 595-600.	Cross-sectional study design.

<p>Watson RL, Langford HG, Abernethy J, Barnes TY, Watson MJ. Urinary electrolytes, body weight, and blood pressure. Pooled cross-sectional results among four groups of adolescent females. <i>Hypertension</i>. 1980 Jul-Aug; 2(4 Pt 2): 93-98.</p>	<p>Cross-sectional study design.</p>
<p>Watt GC, Foy CJ, Hart JT. <u>Comparison of blood pressure, sodium intake, and other variables in offspring with and without a family history of high blood pressure.</u> <i>Lancet</i>. 1983 Jun 4; 1(8, 336): 1, 245-1, 248. PMID: 6134040.</p>	<p>Does not address question. Analyses included combination of adults and children.</p>
<p>Weinberger MH, Fineberg NS, Fineberg SE, Weinberger M. Salt sensitivity, pulse pressure, and death in normal and hypertensive humans. <i>Hypertension</i>. 2001 Feb; 37(2 Part 2): 429-432. PMID: 11230313.</p>	<p>Study population included adults and 18-year-old adolescents.</p>
<p>Weinberger MH. Salt sensitivity is associated with an increased mortality in both normal and hypertensive humans. <i>J Clin Hypertens (Greenwich)</i>. 2002 Jul-Aug; 4(4): 274-276. PMID: 12147930.</p>	<p>Does not clearly address the question for children. Study population included adults and 18-year-old adolescents.</p>
<p>Welty TK, Freni-Titulaer L, Zack MM, Weber P, Sippel J, Huete N, Justice J, Dever D, Murphy MA. <u>Effects of exposure to salty drinking water in an Arizona community. Cardiovascular mortality, hypertension prevalence, and relationships between blood pressure and sodium intake.</u> <i>JAMA</i>. 1986 Feb 7; 255(5): 622-626. PMID: 3944962.</p>	<p>Adult study population.</p>
<p>Wilson DK, Bayer L, Sica D. Variability in salt sensitivity classifications in black male versus female adolescents. <i>Hypertension</i>. 1996; 28: 250-255.</p>	<p>Cross-sectional study design.</p>
<p>Wilson DK, Sica DA, Miller SB. Effects of potassium on blood pressure in salt-sensitive and salt-resistant black adolescents. <i>Hypertension</i>. 1999 Aug; 34(2): 181-186. PMID: 10454438.</p>	<p>Does not address question. Study examined potassium and salt sensitivity.</p>
<p>Wu Y, Cai R, Zhou B, Xu X. Effects of genetic factors and dietary electrolytes on blood pressure of rural secondary school students in Hanzhong. <i>Chin Med Sci J</i>. 1991 Sep; 6(3): 148-152.</p>	<p>Cross-sectional study design.</p>
<p>Yamauchi T, Furuta M, Hamada J, Kondo T, Sakakibara H, Miyao M. <u>Dietary salt intake and blood pressure among schoolchildren.</u> <i>Ann Physiol Anthropol</i>. 1994 Nov; 13(6): 329-336.</p>	<p>Cross-sectional study design.</p>
<p>Yu Z, Song G, Guo Z, Zheng G, Tian H, Vartiainen E, Puska P, Nissinen A. Changes in blood pressure, body mass index, and salt consumption in a Chinese population. <i>Prev Med</i>. 1999 Sep; 29(3): 165-172.</p>	<p>Does not address question of salt intake and BP among children and adolescents. Data analysis combined adolescents with all subjects (15 to 24 years of age).</p>
<p>Zhu KM, He SP, Pan XQ, Zheng XR, Gu YA. The relation of urinary cations to blood pressure in boys aged seven to eight years. <i>Am J Epidemiol</i>. 1987 Oct; 126(4): 658-663.</p>	<p>Cross-sectional study design.</p>